

In response to the limitation in Claim 33 of an "*as-deposited* polysilicon layer filling the trench" (emphasis added) the Examiner stated that the limitation is "considered 'product by process' since the claim is directed to a product, i.e., integrated capacitor, but contain process steps for doping the polysilicon layer." Consequently, the Examiner gave this limitation "no patentable weight."

Initially, Applicants respectfully submit that the Examiner has not met his burden in rejecting Claim 33 as a product-by-process. In examining product-by-process claims, the M.P.E.P. states that "once a product appearing to be substantially identical is found and a 35 U.S.C. rejection made, the burden shifts to the applicant to show an unobvious difference." M.P.E.P. §2113. Thus, to satisfy the Examiner's burden, a product must be found to be "substantially identical." In this regard, however, Applicants note that Vo does not disclose the structural nature of the deposited polycrystalline films, nor does Vo specify any manner of processing. Applicants note, however, that not all polysilicon films are identical. Specifically, as discussed below, "as deposited" polysilicon is structurally distinct from amorphous silicon that has been annealed to form polycrystalline silicon. As such, given this distinction and the lack of a description by Vo, the Examiner has not shown that the polysilicon layer disclosed by Vo is "substantially identical" to the polysilicon layer recited in Claim 33.

Applicants submit that product-by-process law does not apply at all to Claim 33 because the Examiner has misinterpreted that claim. In particular, Applicants stress that Claim 33 is not a product-by-process claim, as the phrase "as-deposited" is a term of art that, in addition to describing a method of formation, describes polysilicon having a particular *structure* that is distinct from the structure of polysilicon formed by post-deposition crystallization.

When interpreting a claim under examination, Applicants note that the interpretation "must be consistent with one that those skilled in the art would reach." *In re Cortwright*, 49 U.S.P.Q.2d 1464, 1467 (Fed. Cir. 1999). Moreover, even if a limitation superficially indicates a process, the limitation may be a product limitation, not a product-by-process limitation, if the limitation is more accurately viewed as *describing* a product *structurally*. See *Hazani v. U.S. Int'l Trade Comm'n*, 44 U.S.P.Q.2d 1358 (Fed. Cir. 1997) (finding that a claim reciting a "chemically engraved" conductive plate was a "true product" claim, not a product-by-process claim, because the limitation served to describe the product structurally).

Regarding Claim 33, the skilled artisan understands that "as-deposited" describes a polysilicon layer that is *structurally distinct* from silicon deposited as amorphous silicon ( $\alpha$ -Si) and annealed to form polycrystalline silicon. Furthermore, Applicants have provided *evidence* that as-deposited polysilicon is not structurally identical to polysilicon formed by other methods. This is made clear, for example, in the article by Kakkad et al., "Crystallized Si Films By Low-Temperature Rapid Thermal Annealing of Amorphous Silicon," J. Appl. Phys., Vol. 65, No. 5 (March 1, 1989), pp. 2069-2072, provided in a previously submitted Supplemental Information Disclosure Statement. In particular, Kakkad et al. note that annealed amorphous silicon has crystalline grains which are larger than the grains of as-deposited silicon layers: "[u]nlike deposited polycrystalline films, [annealed]  $\alpha$ -Si films have grain size exceeding the film thickness." (Kakkad et al., Summary, p. 2072, Col. 2). Consequently, the skilled artisan would understand that "as-deposited" describes polysilicon that is different in granular *structure* from silicon deposited as amorphous silicon ( $\alpha$ -Si) and annealed to form polycrystalline silicon.

Moreover, this structural distinction is of significant consequence to the skilled artisan. Kakkad et al. points out that "as-deposited" polysilicon and annealed amorphous silicon have differences in conductivity. For example, Kakkad et al. measured a conductivity of 500 S/cm for as-deposited polysilicon, whereas annealed amorphous polysilicon with the same doping concentration had a conductivity of 160 S/cm. (Kakkad et al., p. 2071, Table II). Different conductivity is yet another structural property distinguishing "as-deposited" polysilicon from polysilicon formed by other methods. Consequently, Applicants submit that "as-deposited" is not a product-by-process limitation; rather, the skilled artisan would read "as-deposited" as a term of art that describes a particular type of polysilicon with a particular crystalline structure.

Given this structural distinction, Applicants note that the cited reference Vo does not specify the nature of the polycrystalline film filling the disclosed narrow, deep holes. Nor does Vo teach any manner of processing that would indicate to the skilled artisan the nature of the polycrystalline film. Consequently, Applicants submit that Vo does not teach or suggest the invention of independent Claim 33 as recited.

Accordingly, in light of the remarks herein, Applicants respectfully traverse the rejections insofar as they apply to independent Claim 33 and submit that the pending claims are distinguishable. Applicants have not addressed the further anticipation rejections of dependent claims as being moot in view of the remarks herein. However, Applicants expressly do not

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acquiesce in the Examiner's findings not addressed herein. Indeed, Applicants submit that the dependent claims recite further distinguishing features of particular utility.

### **Obviousness Rejections**

The Examiner has rejected Claim 34 as being unpatentable over Vo in view of Mazuré et al. (U.S. Patent No. 5,677,219A). The Examiner stated that "Vo is applied as above but lacks anticipation on disclosing arsenic as an impurity comprised in the doped polysilicon" and that Mazuré et al. satisfied this deficiency.

Applicants note that Claim 34 depends from independent Claim 33. Applicants also note that, as discussed above, Vo does not disclose an "as-deposited silicon layer filling the trench," as recited by Claim 33. Moreover, Mazuré et al. does not supply this deficiency of Vo. Consequently, Applicants submit that the rejection of dependent Claim 34 is moot, as the combination of Vo and Mazuré et al. does not teach each and every limitation of independent Claim 33.

### **CONCLUSIONS**

In view of the foregoing remarks, Applicants submit that the application is in condition for allowance and respectfully request the same. If some issue remains that the Examiner feels may be addressed by Examiner's amendment, the Examiner is cordially invited to call the undersigned for authorization.

Respectfully submitted,

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